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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/931,124	08/16/2001	Takahiko Kishi	678-724 (P9876)	3618

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Paul J. Farrell, Esq.
DILWORTH & BARRESE, LLP
333 Earle Ovington Blvd.
Uniondale, NY 11553

EXAMINER	
ZHENG, EVA Y	
ART UNIT	**PAPER NUMBER**
2611	

DATE MAILED: 06/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/931,124	KISHI, TAKAHIKO	
	Examiner	Art Unit	
	Eva Yi Zheng	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 April 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) *19* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1-18 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 5-8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding to claim 5, claimed subject matter is unclear and confusing. It seems like claim 5 is regarding to embodiment of Fig. 2. The BPF 305 is output to ADC 306. If the filter in claim indicates as BPF 305, then it is not relate to the first mixer in the digital down-converter. On the other hand, if the claimed filter is decimation filter of Fig. 1, then it is not input to ADC.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1, 5, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chalmers (US 5,375,146) in view of Lovinggood et al. (US 6,697,603), further in view of Poklemba (US 5,696,796).

a) Regarding to claim 1, Chalmers disclose a digital down-converter for converting a frequency of a signal, received at a radio receiver and sampled with a radio frequency (RF) or an intermediate frequency (IF), to a detection frequency for a detection process, comprising:

a first mixer (106 in Fig. 1) for converting and outputting a frequency of the received signal to a frequency of a first IF signal by multiplying the signal by a real signal;

a decimation filter (inherent as IF filter 108 in Fig. 1) for suppressing unwanted components among the frequency of the first IF signal from the first mixer (Col 1, L49-51); and

a second mixer (112 in Fig. 1) for converting the frequency of the first IF signal having only wanted components outputted by the decimation filter to a second IF signal of the detection frequency, and outputting the second IF signal as a complex signal by multiplying the output of the decimation filter by a complex local signal by multiplying the output of the decimation filter by a complex local signal (126 and output of 132,134 as shown in Fig. 1).

Chalmers disclose all the subject matters described above except for the specific teaching of (1) a digital signal input for down converting. (2) a first selector and a second selector. (1) Lovinggood et al., in the same field of endeavor, teaches A/D converter (420) output to a digital down converter (as shown in Fig. 3). In addition, Chalmers states that variation of different conversion stages is well known (Col 1, L48-50). Therefore, it is obvious to one of ordinary skill in art to apply the A/D converter of Lovinggood et al. before the digital frequency downconversion in Chalmers' system. By doing so, provide simpler digital down converter design and more desirable result. (2) Moreover, Poklemba, in the same field of endeavor, disclose a first selector for cyclically selecting a multiplication value among cosine wave values of the local signal (106 and 110 in Fig. 4); and a second selector for cyclically selecting a multiplication value among sine wave values of the local signal (108 and 110 in Fig. 4; Col 5, L51-59). Therefore, it is obvious to one of ordinary skill in art to implement the sampling method of Poklemba in the digital downconverter of Chalmers and Lovinggood et al. By doing so, avoid phase imbalance, I/Q crosstalk, and DC offsets in a digital downconverting system.

b) Regarding to claim 5, Chalmers disclose a receiver comprising:

a digital down-converter including a first mixer (106 in Fig. 1) for converting a frequency of the received signal, sampled with a radio frequency (RF) or an intermediate frequency (IF), to a frequency of a first IF signal by multiplying the signal by a real signal (120), and a second mixer (112 in Fig. 1) for converting the first IF signal converted by the first mixer to a second IF signal of the detection frequency for a detection process and then outputting the second IF signal as a complex signal by multiplying the first IF signal by a complex local signal (126 and output of 132,134 as shown in Fig. 1).

An RF unit (as shown in fig. 1) for receiving an input signal and providing the received signal to the digital down-converter for frequency conversion;

A filter (102 in Fig.1) for attenuating an aliasing frequency component and an image frequency component of the first mixer in the digital down-converter, from an output of the radio receiver.

Chalmers disclose all the subject matters described above except for the specific teaching of (1) a digital signal input for down converting and an analog-to-digital converter for sampling an output of the filter with a radio frequency or an intermediate frequency and providing the sampled signal to the digital down-converter. (2) a first selector and a second selector. (1) However, Lovinggood et al., in the same field of endeavor, teaches A/D converter (420) output to a digital down converter (as shown in Fig. 3). Moreover, Chalmers states that variation of different conversion stages is well known (Col 1, L48-50). Therefore, it is obvious to one of ordinary skill in art to apply the A/D converter of Lovinggood et al. before the digital frequency downconversion in Chalmers' system. By doing so, provide simpler digital down converter design and more desirable result. (2) Moreover, Poklemba, in the same field of endeavor, disclose a first selector for cyclically selecting a multiplication value among cosine wave values of the local signal (106 and 110 in Fig. 4); and a second selector for cyclically selecting a multiplication value among sine wave values of the local signal (108 and 110 in Fig. 4; Col 5, L51-59). Therefore, it is obvious to one of ordinary skill in art to implement the sampling method of Poklemba in the digital downconverter of Chalmers and Lovinggood et al. By doing so, avoid phase imbalance, I/Q crosstalk, and DC offsets in a digital downconverting system.

c) Regarding to claim 16, Chalmers discloses a digital down-converter for converting a frequency of a digital signal, received at a radio receiver and sampled with a radio frequency (RF) or an intermediated frequency (1F), to a detection frequency for a detection process, comprising:

a first mixer (106 in Fig. 1) for converting and outputting a frequency of the received signal to frequency of a first IF signal by multiplying the signal by a real signal; and

a second mixer (112 in Fig. 1) for dividing the frequency of the first IF signal into a cosine part and a sine part (output of 132 and 134 in Fig. 1) and for converting and decoding to the frequency of a second IF signal by multiplying the first IF signal by a complex local signal (126 and output of 132,134 as shown in Fig. 1).

two decimation filters for suppressing an unwanted signal of respectively inputted signals (as shown in Fig. 7).

Chalmers disclose all the subject matters described above except for the specific teaching of (1) a digital signal input for down converting. (2) a second mixer processing the cosine part and the since part with a polyphase structure and comprising a selector for selecting and inverting signals (1) However, Lovinggood et al., in the same field of endeavor, teaches A/D converter (420) output to a digital down converter (as shown in Fig. 3). Moreover, Chalmers states that variation of different conversion stages is well known (Col 1, L48-50). Therefore, it is obvious to one of ordinary skill in art to apply the

A/D converter of Lovinggood et al. before the digital frequency downconversion in Chalmers' system. By doing so, provide simpler digital down converter design and more desirable result. (2) Moreover, Poklemba, in the same field of endeavor, disclose a first selector for cyclically selecting a multiplication value among cosine wave values of the local signal (106 and 110 in Fig. 4); and a second selector for cyclically selecting a multiplication value among sine wave values of the local signal (108 and 110 in Fig. 4; Col 5, L51-59; for selecting and inverting). Therefore, it is obvious to one of ordinary skill in art to implement the sampling method of Poklemba in the digital downconverter of Chalmers and Lovinggood et al. By doing so, avoid phase imbalance, I/Q crosstalk, and DC offsets in a digital downconverting system.

6. Claims 2-4, 6-15, 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chalmers (US 5,375,146) in view of Lovinggood et al. (US 6,697,603), further in view of Poklemba (US 5,696,796), and in further view of Ostman (US 6,061,385).

a) Regarding to claims 2, 6, and 17, Chalmers, Lovinggood et al. and Poklemba disclose all of the subject matter described above except for the specific teaching of a frequency of the first IF signal is ¼ a sampling frequency.

Ostman, in same field of endeavor, teaches a received frequency modulated signal as shown in Fig. 1, where the intermediated frequency is a quarter of the sampling frequency (Col 4, L28-36).

To avoid complexity and extreme power consumption of the circuitry a well known method is to select the intermediate frequency to be a quarter of the sampling frequency (Ostman, Col 4, L28-35). Therefore, it is obvious to one of ordinary skill in the art to implement quarter sampling method taught by Ostman in the frequency down conversion system by Chalmers. By doing so, provide simpler digital down converter design and more desirable result. Additionally, reduce power consumption, reduce cost, and simplify communication system design.

b) Regarding to claims 3, 7, 11, and 18, Chalmers discloses further comprising an automatic gain control (AGC) amplifier (110 in Fig. 1) for amplifying of the output of the first mixer and inputting the amplified output to the cosine part and the sine part of the second mixer, and

wherein the first and second selectors are connected to the output of the AGC (Chalmers in view of Poklemba).

c) Regarding to claims 4 and 9, Chalmers discloses the digital down-converter, wherein the second mixer further comprises a multiplier for multiplying the output of the decimation filter by a certain ratio of a sampling frequency and a decoding means for decoding the multiplied signal through the multiplier (as shown in Fig. 1).

d) Regarding to claim 8, Lovinggood et al. disclose the receiver as claimed in claim 6, wherein the second mixer of the digital down-converter is constructed in a polyphase structure comprised of a decimation filter and a quadrature converter (500 in Fig. 3).

e) Regarding to claim 10, the digital down-converter further comprises: wherein the first and second selectors are connected to the output of the decimation filter (108 in Fig. 1 of Chalmers in view of 106 and 108 in Fig. 4 of Poklemba).

f) Regarding to claims 12 and 13, Poklemba disclose wherein the first selector has multiplication values among cosine wave values as 1, 0, -1 and 0, outputs a multiplication result corresponding to a multiplication value 1, outputs a multiplication result corresponding to '-1' by inversion, and a multiplication result '0' corresponding to a multiplication value '0' (106 and 108 in Fig. 4; Col 5, L51-59).

g) Regarding to claims 14 and 15, Poklemba disclose wherein the second selector has multiplication values among cosine wave values as 1, 0, -1 and 0, outputs a multiplication result corresponding to a multiplication value 1, outputs a multiplication result corresponding to '-1' by inversion, and a multiplication result '0' corresponding to a multiplication value '0' (106 and 108 in Fig. 4; Col 5, L51-59).

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eva Y Zheng whose telephone number is 571-272-3049. The examiner can normally be reached on M-F, 7:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on 571-272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Eva Yi Zheng
Examiner
Art Unit 2611

June 19, 2006

CHIEH M. FAN
SUPERVISORY PATENT EXAMINER